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FOREIGN TECHNOLOGY DIVISION



CHRONICLE
ALL-UNION SCIENTIFIC SESSION DEDICATED TO 100th
ANNIVERSARY SINCE THE BIRTH OF THE RADIO INVENTOR
A. S. POPOV

by

L. G. Stolyarov



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BIRTH OF THE RADIO INVENTOR, A. S. POPOV

By: L. G. Stolyarov

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	А а	А, а	Р р	Р р	Р, р
Б б	Б б	В, в	С с	С с	С, с
В в	В в	В, в	Т т	Т т	Т, т
Г г	Г г	Г, г	У у	У у	У, у
Д д	Д д	Д, д	Ф ф	Ф ф	Ф, ф
Е е	Е е	Ye, ye; Е, е*	Х х	Х х	Kh, kh
Ж ж	Ж ж	Zh, zh	Ц ц	Ц ц	Ts, ts
З з	З з	Z, z	Ч ч	Ч ч	Ch, ch
И и	И и	I, i	Ш ш	Ш ш	Sh, sh
Й и	Й и	Y, y	Щ щ	Щ щ	Shch, shch
К к	К к	K, k	Ь ъ	Ь ъ	"
Л л	Л л	L, l	Н н	Н н	Y, y
М м	М м	M, m	҃ ъ	҃ ъ	'
Н н	Н н	N, n	Э э	Э э	E, e
О о	О о	O, o	Ю ю	Ю ю	Yu, yu
П п	П п	P, p	Я я	Я я	Ya, ya

*ye initially, after vowels, and after ъ, ъ; е elsewhere.
When written as ё in Russian, transliterate as ўе or є.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	\sinh^{-1}
cos	cos	ch	cosh	arc ch	\cosh^{-1}
tg	tan	th	tanh	arc th	\tanh^{-1}
ctg	cot	cth	coth	arc cth	\coth^{-1}
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

CHRONICLE

ALL-UNION SCIENTIFIC SESSION DEDICATED TO 100th ANNIVERSARY SINCE THE BIRTH OF THE RADIO INVENTOR, A. S. POPOV

An All-Union Scientific Session dedicated to the 100th Anniversary since the birth the radio inventor, A. S. Popov, was conducted from 8 to 13 June in the Assembly Hall of the Moscow State University and Central Palace of the Soviet Army. This session was called by the Scientific and Technical Society of Radio Engineering and Electrical Communication im. A. S. Popov, organizing committee on celebrating the 100th anniversary of the birth of A. S. Popov, State Committee of the Council of Ministers of the USSR on Radio Electronics, Ministry of Communication of the USSR, Ministry of Culture of the USSR, and All-Union Council on Radiophysics and Radio Engineering of the AS USSR.

Over 2000 specialists took part in this session, including the representatives from higher educational establishments, scientific and research administrations, and industrial concerns, and also representatives from the scientific and technical societies of Hungary, GDR, Poland, USA, Czechoslovakia, China, France, England, and Romania.

The session was opened by the chairman of the Central Board of the Scientific and Technical Society of Radio Engineering and Electrical Communication im. A. S. Popov, corresponding member of the Academy of Sciences of the USSR, V. I. Siforov.

Ceremonial presentation of gold medals im. A. S. Popov, conferred by the decree of the Presidium of the Academy of Sciences of the USSR, was made at the first plenary meeting on the 8th of June to Doctor

Louis Essen (England) for his work involving the creation and use of an atomic standard of frequency and to Doctor of Physicomathematical Sciences S. M. Rytov (USSR) for a series of works in the area of statistical physics.

The President of the Academy of Sciences of the USSR, Academician A. N. Nesmeyanov, warmly greeted the recipients of the gold medal Im. A. S. Popov and awarded them the prizes and diplomas accompanying the medals.

During the same session, reports were made by Academician A. N. Shchukin on the effect of fluctuation interferences on the accuracy of determining the coordinates by means of the radio-engineering techniques and by Academician V. V. Parin on the use of electronics in medicine and biology.

The work of the session was conducted in 15 sections, in which over 300 reports were read concerning the results of the scientific-research and practical work carried out by the scientific-research organizations, concerns, and VUZes in the area of radio engineering, electronics, and electrical communication at Leningrad, Moscow, Gor'kiy, Kiev, Taganrog, Tomsk, Novosibirsk, Odessa, Rostov, Kuybyshev, and many other cities of the country.

Thirty-two lectures and reports were read in the theory of information section. Of considerable interest was the result of the work carried out by V. I. Siforov and L. F. Borodin on coding telegrams by uniform correcting codes. We should note the great scientific and practical importance of this work, which consists of devising a method for determining the economical efficiency of coded communication and creating regular methods for the construction of the correcting codes, as applied to the specific conditions of departmental communication. Of practical and theoretical interest are the materials of the report made by Yu. S. Lezin on threshold signals with an incoherent accumulation with an exponential weight function.

Also a mention should be made of an interesting and new method for analyzing the spectra, which was presented by V. Ye. Murav'yev. The report made by N. L. Teplov contained the details for a general method used to analyze noise immunity of systems with discrete signals with the coherent and noncoherent reception, and general principles have been

formulated for constructing the communication systems that would realize maximum noise immunity. B. N. Mityashchev presented an interesting report in which he examined the problem of noise stability of one of the methods for determining the variable position of pulses. Scientific and practical significance is attributed to the problem of using light as an information transmission channel, which was the theme of the report presented by G. I. Rukman and G. M. Khaplanov. Of considerable benefit to practice are the results obtained by B. S. Tsybakov from the study of the problem dealing with the traffic capacity of the multibeam communication channels. L. F. Borodin also made an interesting report, which was devoted to the speed at which information can be transmitted through symmetrical channels. The results obtained by the author are of scientific and practical significance. I should mention the new approach to the formulation of problems, the benefit derived from the obtained results in the area which is just beginning to be explored, dealing with the theory of the systems based on the use of the sequential analysis in the problems, detection of signals in multichannel systems, presented in the report made by A. Ye. Basharinov, B. S. Flyshman, and T. S. Tyslyatskiy. The problems dealing with the coding of speech are of great theoretical and practical significance. This problem is being studied in the Soviet Union and abroad. The interesting report made by A. M. Polykovskiy examined new coding techniques, which hold a good promise for implementation.

Twenty-six reports were read in the section on general radio engineering. Most lively discussion pertained to the following reports: Ye. Ye. Zhabotinskiy and Yu. L. Sverdlov - on multichannel frequency multipliers; A. N. Polykovskiy - on the new techniques of synchronous modulation and detection; G. M. Utkin - on polyharmonic modes in self-exciting oscillators; M. Ye. Gertsenshteyn and B. Ye. Kinber - on phase relations in a single-circuit parametric amplifier; V. B. Shteynshleyger and G. S. Misezhnikov - on two multiresonator quantum amplifiers; V. F. Nesteruk - on an integral method for detecting a pulse signal with a noise background; D. Ye. Vakman - calculating the transition processes with frequency modulation; A. L. Fel'dshteyn and L. R. Yavich - the experience of and prospects for cataloging certain elements of a SHF channel.

Sixteen reports were presented in the section of ferrite SHF devices. The problems discussed at the meetings of this section were channeled in two directions. The first of these is connected with the problem of constructing ferrite devices with a low level of interferences. The new results in this regard are the elucidation of the problems connected with the theory and methods for realizing parametric ferrite amplifiers of the electromagnetic type (report made by A. L. Mikaelyan and N. Z. Shvartz) and the mixers utilizing nonlinear phenomena in ferrites (report made by A. L. Mikaelyan and V. Ya. Antonyants). Discussion of the questions pertaining to the theory of the most promising ferrite amplifiers of the magnetostatic type (report made by A. A. Pistol'kors and Syuy Yan'-shen' [translator's note: names in this article are transliterated], and report made by Ya. A. Monosov). Development of a theory of shock electromagnetic waves produced by nonlinear properties of a ferrite medium (report made by A. V. Gaponov, L. A. Ostrovskiy, and G. I. Freydman). The second direction pertained to linear waveguide ferrite devices. The most interesting in this area is the theory of the phenomena occurring in ferrite waveguides, which points to the possibility of creating a new type of isolators (report made by A. L. Mikaelyan and A. K. Stolyarov). There is also an interesting development as regards the problems pertaining to the theory and designing of the resonance-type isolators (reports made by A. K. Stolyarov, N. M. Kovtun, and M. V. Vamberskiy).

The principal direction in the work conducted by the electronics section were the problems connected with electronic SHF devices. A part of the reports heard in the section were devoted to the examination of the SHF devices, which are already relatively well known. Other theoretic reports dealt with the problems connected with the construction of the devices based on new principles (interaction of electrons with unhindered waves, parametric amplification, use of a gas discharge, etc.).

Quite an interest was created by the report read by I. M. Bleyvas, I. I. Galitskaya, I. M. Kal'vin, and Ya. I. Mestechkina. The study conducted by the authors of the reports on the electronic phenomena in the interaction space of SHF devices with the aid of an automatic device for constructing the trajectories of charged particles is of

great theoretical and practical value. The experience gained from the use of this automatic machine has shown that it is a valuable tool for the study and development of electronic SHF devices. Of considerable interest is also the report given by V. P. Shestopalov on the "Dispersion properties and space resonance of a spiral waveguide placed into a magnetic-dielectric medium." The studies conducted by A. I. Tershchenko and V. A. Korobkin, in which practical results were obtained on the creation of new, more effective forms of magnetron resonators, are also urgent. I should also mention a theoretical interest of the report made by M. I. Kuznetsov, M. I. Berbasov and V. Ye. Nekhayev, in which results of the study were presented which are directed at the clarification of the physics involved in the fluctuation processes in a magnetron.

The reports made by I. M. Bleyvas, YA. I. Mestechkin and V. B. Khomich described the results obtained from the development of a small trajectograph for the solution of the equations of motion of charged particles in the electrical and magnetic fields. Taking into account the great scientific and practical importance of creating such a universal device for the electronics and physics of the charged particles, it is necessary to take measures to see that a serial production of this device be set up as soon as possible. The report given by A. M. Kharchenko, R. V. Bukhovskaya, M. I. Yelinson, and D. V. Zernov, in which electron contact tubes and some possible circuits in which they can be used were examined, is of practical interest for a number of areas in electronics.

The report given by G. N. Rapoport was devoted to the problem of excitation of a waveguide by an electron beam with periodically varying trajectories. The problem examined in the report is very urgent for new trends in the development of electronic SHF devices.

The report made by A. I. Chikin contained materials, which are of interest in connection with the need to include new designs of electronic-tube devices in the plans for reducing the low-frequency noises.

The optico-radiophysical methods, which saw progress in recent years as one of the trends of quantum radio engineering, are of great scientific and technical interest. The development of these methods is especially promising for solving the problems, which arise when

working with new, shorter-wave ranges of the electromagnetic-wave spectrum. These questions were discussed in the report given by G. I. Rukman and G. M. Khaplanov.

Much attention was given to the report made by V. A. Afanas'yev on "The prospects of reducing the noise ratio of SHF electronic devices", since the solution of this problem is very urgent at the present time. The method proposed in the G. A. Zeytlen's report for calculating the induced current represents a considerable contribution to the theory of interaction between the electrical field and electron flow in a plane gap without a space charge.

I should note the report made by A. V. Gaponov on "The interaction of electromagnetic waves with a nonrectilinear electron flux." The theoretical analysis presented by the speaker is of great interest.

The television section has heard and discussed 32 reports devoted to the various questions pertaining to the technology of television broadcast. The largest part of these reports pertains to the interpretation of the results obtained from the development of new equipment and methods used in color television. These include the following reports: V. I. Baletov - "Color-television equipment for the Moscow Television Center;" V. A. Buldakov - "Studio camera of color television;" V. L. Kreytser - "Transmission of two independent television programs through a common communication channel;" L. N. Shvernik and D. D. Sudravskiy - "Projection equipment for color television;" and a number of others. A substantial group of reports in the section was comprised of those pertaining to the development of a new procedure for the various measurements in the television channel and to the equipment for performing these measurements. The following reports should be mentioned: M. I. Krivosheyev - "Measurement of fluctuation interferences in television;" N. G. Deryugin - "A device for testing the linearity of a television channel;" V. I. Yeremin and O. Ye. Yevnevich-Chekan - "Generator of pulses of the square-sinus type;" and others.

The participants of the session were very interested in the report given by V. G. Kol'tsov and A. S. Angelov on "Transistor television," which is completely transistorized with the exception of the kinescope 43LK65, which is the only vacuum element. The power used by the television is approximately 15 W with a current voltage of 12 V. The size

of the image is 360x270 mm.

Twenty-six reports were presented in the section on the propagation of radio waves which pertain to a number of important trends in the contemporary investigations into the propagation of radio waves. The first group of questions deals with the theoretical and experimental study of tropospheric propagation. A number of reports discussed the phenomenon of scattering, diffraction, turbulence, antenna gain losses, and dispersed reception with far tropospheric propagation of UKV [ultrashort waves]. A number of results obtained from these studies find their application in designing and employment of the UKV communication lines. The second set of questions encompasses theoretical and experimental studies of the heterogeneities in the ionosphere and their effect on wave propagation. The study of this ionosphere structure, which was accomplished in the presented reports, is of practical significance for the operation of the contemporary ionospheric communication links. The third group of questions include a multichannel radio communication and a distant (long-distance) reception of television signals.

A report was given in the section by V. S. Kholsted (USA) which was devoted to the contemporary complex systems of combined communication at long distances with the use of tropospheric propagation of UKV. The reader ended with the operation of both the existing lines of multi-channel radio communication and television and further prospects in the development of radio communication between the USA and Europe.

The section on radio-receiving devices has heard 8 reports, which pertained to the following areas: 1) synthesis and designing of the amplification circuits and 2) reception methods, circuits and parameters of radio receivers. Of considerable interest was the report read by V. I. Shasherin. It clarified the question concerning the conditions under which optimum characteristics can be obtained for the multistage broad-band amplifiers. Very valuable and original materials were presented in the report given by G. I. Levitan and O. I. Vostryakov on the filters with artificial compensation for losses and electrical control of the passband. A number of other reports contained information on a SHF radio receiver with a very narrow passband and a unique solution of the problem of automatic tuning (report made by M. G. Golubtsov, L. T. Remizov, and L. S. Tyufyakin); a new radio-communication

method was devised with an automatic suppression of pulse interferences (Yu. N. Babanov's report); a procedure was given for calculating the detection head of SHF receivers (V. V. Rogozin's report); very important information was given concerning the selectivity of the UKV receivers for the development of broadcasting receivers and for designing of broadcast networks (V. I. Savitskiy's report).

Twenty-two reports were given in the electronic-computer technology section. A number of the reports touched upon the application of semiconductor devices in computers. A part of the reports was devoted to the use of ferrite elements in computers and to their reliability. Other reports examined the promising high-speed magnetic-element circuits. Reports were heard pertaining to the new circuits for feeding systems based on magnetic elements, and also reports devoted to the new designs of memory units using magnetic elements and special cathode-ray tubes.

Much interest was shown in the reports read by V. I. Gevorkyan on "Dynamic trigger using a semiconductor triode;" A. Yu. Gordonov, Ye. B. Gol'dshtik, Ye. I. Zorkov, V. A. Kalikhman, and G. V. Katolikov on "Special elements of transistorized digital computers;" L. N. Patrikeyev, T. M. Arkhanyan, and N. S. Belov et al. on "A complex of semiconductor elements and units of a digital computer." The reports of N. V. Korol'kov and V. S. Gavrilov described the choke-type magnetic elements operating in frequency cycles of the histeresis loop, which create new possibilities in increasing the speed and reducing the power consumed in digital computers.

A mention should be made of the theoretical and practical interest offered by the report given by A. A. Genis on "Designing filament-free thyratron circuits." The report given by V. A. Mamchits showed the promise of using single-cycle ferrite-diode circuits with low frequencies of time pulses, and interesting examples of these circuits were given.

The transmitting devices section has heard and discussed 9 reports. Of great interest was the report read by M. S. Neyman on "Some basic problems in the development of powerful transmitting devices," in which interesting predictions were given for the possible trends in the development of radio transmitters.

The results of the work presented in the report made by V. V. Malanov and K. P. Polyuv on "Theoretical and experimental development of a pulse amplifier of sonic vibrations with the capacity of 1200 W and industrial efficiency of 50%" can be very significant for improving the quality of powerful modulation devices of radio transmitters. V. I. Rassadin proposed a method that can be used for a substantial improvement of technical characteristics of single-band radio transmitters. The report made by Yu. V. Bogoslovskiy contained a method for calculating the stages of radio transmitters with an auto-anode modulation, which is more convenient and suitable for the purposes of analysis and designing.

The theory developed by Ye. P. Korchagina in her report on "Stability of steady-state modes of an oscillator with a circuit between the anode and grid" makes it possible to explain a series of phenomena observed in practice and which, prior to this, did not have a satisfactory explanation. Another interesting report that should be noted is that presented by S. I. Yevtyanov on "Two-cycle frequency dividers," in which a new type of circuits was proposed for frequency division, and also results were given which were obtained from their theoretical and experimental study.

* * *

V. I. Siforov, a corresponding member of the AS USSR, spoke at the concluding plenary meeting, who devoted his topic to the theory of the radio-communication channels with arbitrarily varying parameters.

Corresponding member of the AS USSR A. A. Pistol'kors spoke on the problem of antenna synthesis.

Doctor of Technical Sciences A. L. MIkaelyan examined the questions of the nonlinear theory of a ferrite generator, which makes it possible to establish not only the conditions under which parametric oscillations are excited but also to calculate the oscillation amplitude in a steady state.

The report by Doctor of Physicomathematical Sciences E. I. Adirovich examined the reactive properties of the transistors which give rise to the transitional and frequency dependences, which are determined by the relaxation processes occurring in the p-n junctions and

in the quasineutrality regions.

Representatives from scientific-technical societies of foreign countries gave a welcoming speech at the conference, who emphasized the importance of the session that was conducted as regards the strengthening and broadening of the scientific and technical intercourse of the Soviet scientists and engineers with the specialists of the foreign countries.

Engineer L. G. Stolyarov

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